



AEC-NASA TECH BRIEF



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Computer Subroutine ISUDS Accurately Solves Large System of Simultaneous Linear Algebraic Equations

The problem:

The accuracy of a solution for a set of simultaneous equations decreases as the order of the system increases. A computer program is required that can obtain double-precision accuracy while using a single-precision coefficient matrix to conserve memory storage.

The solution:

A computer program, an Iterative Scheme Using a Direct Solution (ISUDS), which obtains double precision accuracy using a single-precision coefficient matrix.

How it's done:

ISUDS finds a solution to a system of equations and increases its accuracy while using a single precision coefficient matrix. The equations are written in matrix form as $AX=B$, where A is a square non-singular coefficient matrix, X is a vector, and B is a vector. The values of X that are found are substituted into the equations and the residuals are calculated, using double-precision arithmetic.

The system of equations is then solved again, except with the residuals of the equations as the right-hand sides. The first solution (X_1) satisfies the equations with the right-hand side equal to the vector B , minus the residuals R , while the second solution (X_2) satisfies the same system with the residuals on the

right-hand side. Hence, X_1+X_2 satisfies the same system of equations, and since $(B-R)+R=B$, the sum of X_1+X_2 will give an accurate solution to $AX=B$. A solution to any desired accuracy may be obtained on a digital computer, depending on the word size.

Notes:

1. The digital computer code ISUDS is written in Fortran IV language for use on the IBM 7094 and is based on the use of ISIMEQ, a 7094 Fortran simultaneous linear equation subroutine. A storage capacity of approximately 32K is required.
2. Inquiries concerning this program may be directed to:

COSMIC
Computer Center
University of Georgia
Athens, Georgia 30601
Reference: B67-10344

Patent status:

No patent action is contemplated by AEC or NASA.

Source: George Collier
of Westinghouse Astronuclear Laboratory
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Category 06

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Computer Simulation of a Space Shuttle Launch System

The problem of simulating a space shuttle launch system is a complex one. It involves the interaction of many different systems, including the shuttle itself, the launch vehicle, the launch pad, and the support systems. The simulation must be able to handle the large amounts of data generated by these systems and to provide a realistic representation of the launch process.

The solution to this problem is a computer simulation program that has been developed by the NASA Langley Research Center. This program is capable of simulating the entire launch process, from the time the shuttle is launched to the time it reaches orbit. It can handle the large amounts of data generated by the launch system and can provide a realistic representation of the launch process.

This program is a very powerful tool for the study of space shuttle launch systems. It can be used to study the effects of different launch parameters on the launch process, to study the effects of different launch vehicle configurations on the launch process, and to study the effects of different launch pad configurations on the launch process. It can also be used to study the effects of different support system configurations on the launch process. This program is a very valuable tool for the study of space shuttle launch systems.

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